

SEQUENCE LISTING

<110> WAKO PURE CHEMICAL INDUSTRIES, LTD.

5 <120> Hybrid Enzymes and Use Thereof

<130> WJ018

<140>

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<160> 56

<170> PatentIn Ver. 2.1

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<211> 206

<212> PRT

<213> Human

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06070257.061201

Phe Thr Val Cys Leu His Phe Tyr Thr Glu Leu Ser Ser Thr Arg Gly

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40

45

Tyr Ser Ile Phe Ser Tyr Ala Thr Lys Arg Gln Asp Asn Glu Ile Leu

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Ile Phe Trp Ser Lys Asp Ile Gly Tyr Ser Phe Thr Val Gly Gly Ser

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10 Glu Ile Leu Phe Glu Val Pro Glu Val Thr Val Ala Pro Val His Ile

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Cys Thr Ser Trp Glu Ser Ala Ser Gly Ile Val Glu Phe Trp Val Asp

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Gly Lys Pro Arg Val Arg Lys Ser Leu Lys Lys Gly Tyr Thr Val Gly

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Ala Glu Ala Ser Ile Ile Leu Gly Gln Glu Gln Asp Ser Phe Gly Gly

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Asn Phe Glu Gly Ser Gln Ser Leu Val Gly Asp Ile Gly Asn Val Asn

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25 Met Trp Asp Phe Val Leu Ser Pro Asp Glu Ile Asn Thr Ile Tyr Leu

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00679257 061201

Gly Gly Pro Phe Ser Pro Asn Val Leu Asn Trp Arg Ala Leu Lys Tyr

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Glu Val Gln Gly Glu Val Phe Thr Lys Pro Gln Leu Trp Pro

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25 <211> 486

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<213> Leuconostoc mesenteroides

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Asp Leu Ala Lys Arg Lys Leu Tyr Pro Ser Val Phe Asn Leu Tyr Lys

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Lys Gly Tyr Leu Gln Lys His Phe Ala Ile Val Gly Thr Ala Arg Gln

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40

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Ala Leu Asn Asp Asp Glu Phe Lys Gln Leu Val Arg Asp Ser Ile Lys

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Asp Phe Thr Asp Asp Gln Ala Gln Ala Glu Ala Phe Ile Glu His Phe

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Ser Tyr Arg Ala His Asp Val Thr Asp Ala Ala Ser Tyr Ala Val Leu

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Lys Glu Ala Ile Glu Glu Ala Ala Asp Lys Phe Asp Ile Asp Gly Asn

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Arg Ile Phe Tyr Met Ser Val Ala Pro Arg Phe Phe Gly Thr Ile Ala

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Lys Tyr Leu Lys Ser Glu Gly Leu Leu Ala Asp Thr Gly Tyr Asn Arg

09879257 "061201

130

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Leu Met Ile Glu Lys Pro Phe Gly Thr Ser Tyr Asp Thr Ala Ala Glu

145

150

155

160

5

Leu Gln Asn Asp Leu Glu Asn Ala Phe Asp Asp Asn Gln Leu Phe Arg

165

170

175

Ile Asp His Tyr Leu Gly Lys Glu Met Val Gln Asn Ile Ala Ala Leu

10

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Arg Phe Gly Asn Pro Ile Phe Asp Ala Ala Trp Asn Lys Asp Tyr Ile

195

200

205

15

Lys Asn Val Gln Val Thr Leu Ser Glu Val Leu Gly Val Glu Glu Arg

210

215

220

Ala Gly Tyr Tyr Asp Thr Ala Gly Ala Leu Leu Asp Met Ile Gln Asn

225

230

235

240

20

His Thr Met Gln Ile Val Gly Trp Leu Ala Met Glu Lys Pro Glu Ser

245

250

255

Phe Thr Asp Lys Asp Ile Arg Ala Ala Lys Asn Ala Ala Phe Asn Ala

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265

270

Leu Lys Ile Tyr Asp Glu Ala Glu Val Asn Lys Tyr Phe Val Arg Ala

09379257-061201

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Gln Tyr Gly Ala Gly Asp Ser Ala Asp Phe Lys Pro Tyr Leu Glu Glu

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300

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Leu Asp Val Pro Ala Asp Ser Lys Asn Asn Thr Phe Ile Ala Gly Glu

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Leu Gln Phe Asp Leu Pro Arg Trp Glu Gly Val Pro Phe Tyr Val Arg

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330

335

Ser Gly Lys Arg Leu Ala Ala Lys Gln Thr Arg Val Asp Ile Val Phe

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345

350

15

Lys Ala Gly Thr Phe Asn Phe Gly Ser Glu Gln Glu Ala Gln Glu Ala

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360

365

Val Leu Ser Ile Ile Ile Asp Pro Lys Gly Ala Ile Glu Leu Lys Leu

370

375

380

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Asn Ala Lys Ser Val Glu Asp Ala Phe Asn Thr Arg Thr Ile Asp Leu

385

390

395

400

Gly Trp Thr Val Ser Asp Glu Asp Lys Lys Asn Thr Pro Glu Pro Tyr

25

405

410

415

Glu Arg Met Ile His Asp Thr Met Asn Gly Asp Gly Ser Asn Phe Ala

09879257-061201

420

425

430

Asp Trp Asn Gly Val Ser Ile Ala Trp Lys Phe Val Asp Ala Ile Ser

435

440

445

5

Ala Val Tyr Thr Ala Asp Lys Ala Pro Leu Glu Thr Tyr Lys Ser Gly

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Ser Met Gly Pro Glu Ala Ser Asp Lys Leu Leu Ala Ala Asn Gly Asp

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Ala Trp Val Phe Lys Gly

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<212> DNA

<213> Artificial Sequence

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<223> Description of Artificial Sequence: Oligonucleotide primer

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09070207 061201

<210> 8

<211> 30

<212> DNA

<213> Artificial Sequence

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<223> Description of Artificial Sequence: Oligonucleotide primer

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10 ttccccgggct ttaattaacc tttaaacace

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<210> 9

<211> 30

15 <212> DNA

<213> Artificial Sequence

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<223> Description of Artificial Sequence: Oligonucleotide primer

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<400> 9

tggttggtta gctatggaaa aaccagaatc

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25 <210> 10

<211> 34

<212> DNA

06679257.061201

<213> Artificial Sequence

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<223> Description of Artificial Sequence: Oligonucleotide primer

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<400> 10

taggatccag gtacgtctaa ttcttcaagg tatg 34

10 <210> 11

<211> 32

<212> DNA

<213> Artificial Sequence

15 <220>

<223> Description of Artificial Sequence: Oligonucleotide primer

<400> 11

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<210> 12

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<212> DNA

25 <213> Artificial Sequence

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aagcttgcac gcctgcaggt tcccg

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<212> DNA

<213> Artificial Sequence

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<223> Description of Artificial Sequence: Oligonucleotides consisting of the DNA coding for amino acids of Sequence 2, and a partial restriction site of BamHI consisting of 5' end of "gatcc" and 3' end of "g".

gatccgacat gtcgaggaag gcttttgtgt ttcccaaaga gtcggataact tccg

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<211> 54

<212> DNA

<213> Artificial Sequence

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<220>

<223> Description of Artificial Sequence: Complementary DNA of Sequence 13

gatccggaag tatccgactc tttgggaaac acaaaagcct tcctcgacat gtcg 54

<210> 15

<211> 48

<212> DNA

<213> Artificial Sequence

 $\langle 220 \rangle$

<223> Description of Artificial Sequence: Oligonucleotide consisting of the DNA coding for partial amino acids of Sequence 3, and a partial restriction site of BamHI consisting of 5' end of "gatcc" and 3' end of "g".

<400> 15

gatccgtgct gtcaccagat gagattaaca ccatctatct tggcgggg 48

20 <210> 16

<211> 48

<212> DNA

<213> Artificial Sequence

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<223> Description of Artificial Sequence: Complementary DNA of Sequence 15

<400> 16

gatcccccgc caagatagat ggtgttaatc tcattctggg acagcacg

48

5 <210> 17

<211> 42

<212> DNA

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<223> Description of Artificial Sequence: Oligonucleotide consisting of the DNA coding for amino acids of Sequence 4, and a partial restriction site of BamHI consisting of 5' end of "gatcc" and 3' end of "g".

15 <400> 17

gatccctgaa gaagggatac actgtggggg cagaagcaag cg

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<210> 18

20 <211> 42

<212> DNA

<213> Artificial Sequence

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25 <223> Description of Artificial Sequence: Complementary DNA of Sequence 17

<400> 18

00079257.061201

gatccgcttg cttctgcccc cacagtgtat ccccttctca gg

42

<210> 19

5 <211> 36

<212> DNA

<213> Artificial Sequence

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10 <223> Description of Artificial Sequence: Oligonucleotide consisting of the DNA coding for amino acids of Sequence 5, and a partial restriction site of BamHI consisting of 5' end of "gatcc" and 3' end of "g".

<400> 19

15 gatcccgggc actgaagtat gaagtgaag gcgaag

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<210> 20

<211> 36

20 <212> DNA

<213> Artificial Sequence

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<223> Description of Artificial Sequence: Complementary DNA of Sequence 19

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gatccttcgc cttgcacttc atacttcagt gcccg

36

00079257.061201

<210> 21

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5 <212> DNA

<213> Artificial Sequence

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10 <223> Description of Artificial Sequence: Oligonucleotide consisting of the DNA coding for partial amino acids of Sequence 3, and a partial restriction site of BamHI consisting of 5' end of "gatcc" and 3' end of "g".

<400> 21

15 gatccctagtg ggagacattg gaaatgtgaa catgtgggac tttgtgg 47

<210> 22

<211> 47

<212> DNA

20 <213> Artificial Sequence

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<223> Description of Artificial Sequence: Complementary DNA of Sequence 21

25 <400> 22

gatccacaaa agtccacat gttcacattt ccaatgtctc ccactag 47

09879257.06.1204

<210> 23

<211> 33

<212> DNA

5 <213> Artificial Sequence

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<223> Description of Artificial Sequence: Oligonucleotide Primer

10 <400> 23

taggatccgt ctaattcttc aaggtatggc ttg

33

<210> 24

15 <211> 34

<212> DNA

<213> Artificial Sequence

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20 <223> Description of Artificial Sequence: Oligonucleotide Primer

<400> 24

aaggatccgt acctgctgat tctaaaaaca atac

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<212> DNA

<213> Artificial Sequence

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ttggatccag caggtacgtc taattcttca ag

32

10 <210> 26

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<212> DNA

<213> Artificial Sequence

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<223> Description of Artificial Sequence: Oligonucleotide Primer

<400> 26

taggatccga ttctaaaaac aataccttca tcg

33

20

<210> 27

<211> 34

<212> DNA

25 <213> Artificial Sequence

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09879257-061201

<223> Description of Artificial Sequence: Oligonucleotide Primer

<400> 27

gggtgtttaa aggtggatcc taattaaagc cggg

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<210> 28

<211> 32

<212> DNA

10 <213> Artificial Sequence

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<223> Description of Artificial Sequence: Oligonucleotide Primer

15 <400> 28

taggatcctt ctgaacacaa gttaaactg cc

32

<210> 29

20 <211> 32

<212> DNA

<213> Artificial Sequence

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25 <223> Description of Artificial Sequence: Oligonucleotide Primer

<400> 29

6879257 "061204

atggatccca agaagcaca gaagctgtct tg

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5 <211> 1024

<212> PRT

<213> Escherichia coli

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Trp Glu Asn Pro Gly Val Thr Gln Leu Asn Arg Leu Ala Ala His Pro

20 25 30

15

Pro Phe Ala Ser Trp Arg Asn Ser Glu Glu Ala Arg Thr Asp Arg Pro

35 40 45

Ser Gln Gln Leu Arg Ser Leu Asn Gly Glu Trp Arg Phe Ala Trp Phe

20 50 55 60

Pro Ala Pro Glu Ala Val Pro Glu Ser Trp Leu Glu Cys Asp Leu Pro

65 70 75 80

25 Glu Ala Asp Thr Val Val Val Pro Ser Asn Trp Gln Met His Gly Tyr

85 90 95

00070257.061201

Asp Ala Pro Ile Tyr Thr Asn Val Thr Tyr Pro Ile Thr Val Asn Pro

100

105

110

Pro Phe Val Pro Thr Glu Asn Pro Thr Gly Cys Tyr Ser Leu Thr Phe

5

115

120

125

Asn Val Asp Glu Ser Trp Leu Gln Glu Gly Gln Thr Arg Ile Ile Phe

130

135

140

10 Asp Gly Val Asn Ser Ala Phe His Leu Trp Cys Asn Gly Arg Trp Val

145

150

155

160

Gly Tyr Gly Gln Asp Ser Arg Leu Pro Ser Glu Phe Asp Leu Ser Ala

165

170

175

15

Phe Leu Arg Ala Gly Glu Asn Arg Leu Ala Val Met Val Leu Arg Trp

180

185

190

Ser Asp Gly Ser Tyr Leu Glu Asp Gln Asp Met Trp Arg Met Ser Gly

20

195

200

205

Ile Phe Arg Asp Val Ser Leu Leu His Lys Pro Thr Thr Gln Ile Ser

210

215

220

25 Asp Phe His Val Ala Thr Arg Phe Asn Asp Asp Phe Ser Arg Ala Val

225

230

235

240

09679257.061201

Leu Glu Ala Glu Val Gln Met Cys Gly Glu Leu Arg Asp Tyr Leu Arg

245

250

255

Val Thr Val Ser Leu Trp Gln Gly Glu Thr Gln Val Ala Ser Gly Thr

5

260

265

270

Ala Pro Phe Gly Gly Glu Ile Ile Asp Glu Arg Gly Gly Tyr Ala Asp

275

280

285

10 Arg Val Thr Leu Arg Leu Asn Val Glu Asn Pro Lys Leu Trp Ser Ala

290

295

300

Glu Ile Pro Asn Leu Tyr Arg Ala Val Val Glu Leu His Thr Ala Asp

305

310

315

320

15

Gly Thr Leu Ile Glu Ala Glu Ala Cys Asp Val Gly Phe Arg Glu Val

325

330

335

Arg Ile Glu Asn Gly Leu Leu Leu Leu Asn Gly Lys Pro Leu Leu Ile

20

340

345

350

Arg Gly Val Asn Arg His Glu His His Pro Leu His Gly Gln Val Met

355

360

365

25 Asp Glu Gln Thr Met Val Gln Asp Ile Leu Leu Met Lys Gln Asn Asn

370

375

380

09879257 061201
101201

Phe Asn Ala Val Arg Cys Ser His Tyr Pro Asn His Pro Leu Trp Tyr
385 390 395 400

Thr Leu Cys Asp Arg Tyr Gly Leu Tyr Val Val Asp Glu Ala Asn Ile
5 405 410 415

Glu Thr His Gly Met Val Pro Met Asn Arg Leu Thr Asp Asp Pro Arg
420 425 430

10 Trp Leu Pro Ala Met Ser Glu Arg Val Thr Arg Met Val Gln Arg Asp
435 440 445

Arg Asn His Pro Ser Val Ile Ile Trp Ser Leu Gly Asn Glu Ser Gly
450 455 460

15 His Gly Ala Asn His Asp Ala Leu Tyr Arg Trp Ile Lys Ser Val Asp
465 470 475 480

Pro Ser Arg Pro Val Gln Tyr Glu Gly Gly Gly Ala Asp Thr Thr Ala
20 485 490 495

Thr Asp Ile Ile Cys Pro Met Tyr Ala Arg Val Asp Glu Asp Gln Pro
500 505 510

25 Phe Pro Ala Val Pro Lys Trp Ser Ile Lys Lys Trp Leu Ser Leu Pro
515 520 525

06279267 061201

Gly Glu Thr Arg Pro Leu Ile Leu Cys Glu Tyr Ala His Ala Met Gly

530

535

540

Asn Ser Leu Gly Gly Phe Ala Lys Tyr Trp Gln Ala Phe Arg Gln Tyr

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545

550

555

560

Pro Arg Leu Gln Gly Gly Phe Val Trp Asp Trp Val Asp Gln Ser Leu

565

570

575

10 Ile Lys Tyr Asp Glu Asn Gly Asn Pro Trp Ser Ala Tyr Gly Gly Asp

580

585

590

Phe Gly Asp Thr Pro Asn Asp Arg Gln Phe Cys Met Asn Gly Leu Val

595

600

605

15

Phe Ala Asp Arg Thr Pro His Pro Ala Leu Thr Glu Ala Lys His Gln

610

615

620

Gln Gln Phe Phe Gln Phe Arg Leu Ser Gly Gln Thr Ile Glu Val Thr

20

625

630

635

640

Ser Glu Tyr Leu Phe Arg His Ser Asp Asn Glu Leu Leu His Trp Met

645

650

655

25 Val Ala Leu Asp Gly Lys Pro Leu Ala Ser Gly Glu Val Pro Leu Asp

660

665

670

09879257 061201
102190" 25262860

Val Ala Pro Gln Gly Lys Gln Leu Ile Glu Leu Pro Glu Leu Pro Gln

675

680

685

Pro Glu Ser Ala Gly Gln Leu Trp Leu Thr Val Arg Val Val Gln Pro

5

690

695

700

Asn Ala Thr Ala Trp Ser Glu Ala Gly His Ile Ser Ala Trp Gln Gln

705

710

715

720

10 Trp Arg Leu Ala Glu Asn Leu Ser Val Thr Leu Pro Ala Ala Ser His

725

730

735

Ala Ile Pro His Leu Thr Thr Ser Glu Met Asp Phe Cys Ile Glu Leu

740

745

750

15

Gly Asn Lys Arg Trp Gln Phe Asn Arg Gln Ser Gly Phe Leu Ser Gln

755

760

765

Met Trp Ile Gly Asp Lys Lys Gln Leu Leu Thr Pro Leu Arg Asp Gln

20

770

775

780

Phe Thr Arg Ala Pro Leu Asp Asn Asp Ile Gly Val Ser Glu Ala Thr

785

790

795

800

25 Arg Ile Asp Pro Asn Ala Trp Val Glu Arg Trp Lys Ala Ala Gly His

805

810

815

09879257.061201

Tyr Gln Ala Glu Ala Ala Leu Leu Gln Cys Thr Ala Asp Thr Leu Ala

820

825

830

Asp Ala Val Leu Ile Thr Thr Ala His Ala Trp Gln His Gln Gly Lys

5

835

840

845

Thr Leu Phe Ile Ser Arg Lys Thr Tyr Arg Ile Asp Gly Ser Gly Gln

850

855

860

10 Met Ala Ile Thr Val Asp Val Glu Val Ala Ser Asp Thr Pro His Pro

865

870

875

880

Ala Arg Ile Gly Leu Asn Cys Gln Leu Ala Gln Val Ala Glu Arg Val

885

890

895

15

Asn Trp Leu Gly Leu Gly Pro Gln Glu Asn Tyr Pro Asp Arg Leu Thr

900

905

910

Ala Ala Cys Phe Asp Arg Trp Asp Leu Pro Leu Ser Asp Met Tyr Thr

20

915

920

925

Pro Tyr Val Phe Pro Ser Glu Asn Gly Leu Arg Cys Gly Thr Arg Glu

930

935

940

25 Leu Asn Tyr Gly Pro His Gln Trp Arg Gly Asp Phe Gln Phe Asn Ile

945

950

955

960

00079257.061201

Ser Arg Tyr Ser Gln Gln Gln Leu Met Glu Thr Ser His Arg His Leu

965

970

975

Leu His Ala Glu Glu Gly Thr Trp Leu Asn Ile Asp Gly Phe His Met

5

980

985

990

Gly Ile Gly Gly Asp Asp Ser Trp Ser Pro Ser Val Ser Ala Glu Phe

995

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1005

10 Gln Leu Ser Ala Gly Arg Tyr His Tyr Gln Leu Val Trp Cys Gln Lys

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1015

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<210> 31

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<212> PRT

20 <213> Escherichia coli

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25

Thr Ala Pro Gly Gly Ala Arg Arg Leu Thr Gly Asp Gln Thr Ala Ala

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25

30

00879257 061201

Leu Arg Asp Ser Leu Ser Asp Lys Pro Ala Lys Asn Ile Ile Leu Leu

35

40

45

5 Ile Gly Asp Gly Met Gly Asp Ser Glu Ile Thr Ala Ala Arg Asn Tyr

50

55

60

Ala Glu Gly Ala Gly Gly Phe Phe Lys Gly Ile Asp Ala Leu Pro Leu

65

70

75

80

10

Thr Gly Gln Tyr Thr His Tyr Ala Leu Asn Lys Lys Thr Gly Lys Pro

85

90

95

Asp Tyr Val Thr Asp Ser Ala Ala Ser Ala Thr Ala Trp Ser Thr Gly

15

100

105

110

Val Lys Thr Tyr Asn Gly Ala Leu Gly Val Asp Ile His Glu Lys Asp

115

120

125

20 His Pro Thr Ile Leu Glu Met Ala Lys Ala Ala Gly Leu Ala Thr Gly

130

135

140

Asn Val Ser Thr Ala Glu Leu Gln Asp Ala Thr Pro Ala Ala Leu Val

145

150

155

160

25

Ala His Val Thr Ser Arg Lys Cys Tyr Gly Pro Ser Ala Thr Ser Glu

165

170

175

0079257 061201

Lys Cys Pro Gly Asn Ala Leu Glu Lys Gly Gly Lys Gly Ser Ile Thr
 180 185 190

5 Glu Gln Leu Leu Asn Ala Arg Ala Asp Val Thr Leu Gly Gly Gly Ala
 195 200 205

Lys Thr Phe Ala Glu Thr Ala Thr Ala Gly Glu Trp Gln Gly Lys Thr
 210 215 220

10 Leu Arg Glu Gln Ala Gln Ala Arg Gly Tyr Gln Leu Val Ser Asp Ala
 225 230 235 240

15 Ala Ser Leu Asn Ser Val Thr Glu Ala Asn Gln Gln Lys Pro Leu Leu
 245 250 255

Gly Leu Phe Ala Asp Gly Asn Met Pro Val Arg Trp Leu Gly Pro Lys
 260 265 270

20 Ala Thr Tyr His Gly Asn Ile Asp Lys Pro Ala Val Thr Cys Thr Pro
 275 280 285

Asn Pro Gln Arg Asn Asp Ser Val Pro Thr Leu Ala Gln Met Thr Asp
 290 295 300

25 Lys Ala Ile Glu Leu Leu Ser Lys Asn Glu Lys Gly Phe Phe Leu Gln
 305 310 315 320

0070257.061201

Val Glu Gly Ala Ser Ile Asp Lys Gln Asp His Ala Ala Asn Pro Cys

325

330

335

5 Gly Gln Ile Gly Glu Thr Val Asp Leu Asp Glu Ala Val Gln Arg Ala

340

345

350

Leu Glu Phe Ala Lys Lys Glu Gly Asn Thr Leu Val Ile Val Thr Ala

355

360

365

10

Asp His Ala His Ala Ser Gln Ile Val Ala Pro Asp Thr Lys Ala Pro

370

375

380

Gly Leu Thr Gln Ala Leu Asn Thr Lys Asp Gly Ala Val Met Val Met

15

385

390

395

400

Ser Tyr Gly Asn Ser Glu Glu Asp Ser Gln Glu His Thr Gly Gln Leu

405

410

415

20 Arg Ile Ala Ala Tyr Gly Pro His Ala Ala Asn Val Val Gly Leu Thr

420

425

430

Asp Gln Thr Asp Leu Phe Tyr Thr Met Lys Ala Ala Leu Gly Leu Lys

435

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445

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<210> 32

<211> 45

00079257.061201

<212> DNA

<213> Artificial Sequence

<220>

- 5 <223> Description of Artificial Sequence: Oligonucleotides consisting of the DNA coding for partial amino acids of Sequence 2, and a partial restriction site of BamHI consisting of 5' end of "gatcc" and 3' end of "g".

10 <400> 32

gatccgacat gtcgaggaag gcttttgtgt ttcccaaaga gtcgg

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<210> 33

15 <211> 45

<212> DNA

<213> Artificial Sequence

<220>

- 20 <223> Description of Artificial Sequence: Complementary DNA of Sequence 32

<400> 33

gatcccgact ctttgggaaa cacaaaagcc ttctcgaca tgtcg

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25

<210> 34

09070257.061204

<211> 36

<212> DNA

<213> Artificial Sequence

5 <220>

<223> Description of Artificial Sequence: Oligonucleotides consisting of the DNA coding for partial amino acids of Sequence 2, and a partial restriction site of BamHI consisting of 5' end of "gatcc" and 3' end of "g".

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<400> 34

gatccaggaa ggcttttgtg tttcccaaag agtcgg 36

15 <210> 35

<211> 36

<212> DNA

<213> Artificial Sequence

20 <220>

<223> Description of Artificial Sequence: Complementary DNA of Sequence 34

<400> 35

gatcccgact ctttgggaaa cacaaaagcc ttctg 36

25

09879257 061201

<210> 36

<211> 36

<212> DNA

<213> Artificial Sequence

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<220>

<223> Description of Artificial Sequence: Oligonucleotide primer

<400> 36

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<210> 37

<211> 32

15 <212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Oligonucleotide primer

20

<400> 37

ttggatccat caccggcacc atattgtgca cg 32

25 <210> 38

<211> 33

<212> DNA

09070257.061204

<213> Artificial Sequence

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<223> Description of Artificial Sequence: Oligonucleotide primer

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<400> 38

aaggatcctc agctgacttc aagccatacc ttg 33

10 <210> 39

<211> 31

<212> DNA

<213> Artificial Sequence

15 <220>

<223> Description of Artificial Sequence: Oligonucleotide primer

<400> 39

aaggatccaa ggtatggctt gaagtcagct g 31

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<210> 40

<211> 31

<212> DNA

25 <213> Artificial Sequence

<220>

09879257.1061201

<223> Description of Artificial Sequence: Oligonucleotide primer

<400> 40

aaggatccaa ggtatggctt gaagtcagct g 31

5

<210> 41

<211> 30

<212> DNA

10 <213> Artificial Sequence

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<223> Description of Artificial Sequence: Oligonucleotide primer

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ggtacgtata attcatcaag gtatggcttg 30

<210> 42

20 <211> 26

<212> DNA

<213> Artificial Sequence

<220>

25 <223> Description of Artificial Sequence: Oligonucleotide primer

<400> 42

09879257-061201

tatacgtacc tgctgattct aaaaac

26

<210> 43

5 <211> 30

<212> DNA

<213> Artificial Sequence

<220>

10 <223> Description of Artificial Sequence: Oligonucleotides consisting of
the DNA coding for partial amino acids of Sequence 2 .

<400> 43

aggaaggctt ttgtgtttcc caaagagtcg

30

15

<210> 44

<211> 30

<212> DNA

20 <213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Complementary DNA of Sequence 43

25 <400> 44

cgactctttg ggaaacacaa aagccttcct

30

09879257 061201

<210> 45

<211> 55

<212> PRT

<213> Hepatitis B virus

5

<400> 45

Met Gln Trp Asn Ser Thr Ala Phe His Gln Ala Leu Gln Asp Pro Arg

1 5 10 15

10 Val Arg Gly Leu Tyr Phe Pro Ala Gly Gly Ser Ser Ser Gly Thr Val

20 25 30

Asn Pro Ala Pro Asn Ile Ala Ser His Ile Ser Ser Ile Ser Ala Arg

35 40 45

Thr Gly Asp Pro Val Thr Asn

15 50 55

<210> 46

<211> 12

20 <212> PRT

<213> Hepatitis B virus

<400> 46

Asp Pro Arg Val Arg Gly Leu Tyr Phe Pro Ala Gly

25 1 5 10

00679257 064201
102190 75267060

<210> 47

<211> 42

<212> DNA

5 <213> Artificial Sequence

<220>

10 <223> Description of Artificial Sequence: Oligonucleotides consisting of the DNA coding for amino acids of Sequence 46, and a partial restriction site of BamHI consisting of 5' end of "gatcc" and 3' end of "g".

<400> 47

gatccgaccc gcgtgttcgt ggtctgtatt tcccggtgg tg 42

15

<210> 48

<211> 42

<212> DNA

<213> Artificial Sequence

20

<220>

<223> Description of Artificial Sequence: Complementary DNA of Sequence 47

<400> 48

25 gatccaccag ccgggaaata cagaccacga acacgcgggt cc 42

00670257 061201

<210> 49

<211> 84

<212> PRT

5 <213> Human

<400> 49

Ala Val Ser Glu Ile Gln Phe Met His Asn Leu Gly Lys His Leu Ser

1 5 10 15

10 Ser Met Glu Arg Val Glu Trp Leu Arg Lys Lys Leu Gln Asp Val His

20 25 30

Asn Phe Val Ala Leu Gly Ala Ser Ile Ala Tyr Arg Asp Gly Ser Ser

35 40 45

Gln Arg Pro Arg Lys Lys Glu Asp Asn Val Leu Val Glu Ser His Gln

15 50 55 60

Lys Ser Leu Gly Glu Ala Asp Lys Ala Asp Val Asp Val Leu Ile Lys

65 70 75 80

Ala Lys Pro Gln

20

<210> 50

<211> 15

<212> PRT

<213> Human

25

<400> 50

Glu Arg Val Glu Trp Leu Arg Lys Lys Leu Gln Asp Val His Asn

00079257.061201

1

5

10

15

<210> 51

5 <211> 51

<212> DNA

<213> Artificial Sequence

<220>

10 <223> Description of Artificial Sequence: Oligonucleotides consisting of the DNA coding for amino acids of Sequence 50, and a partial restriction site of BamHI consisting of 5' end of "gatcc" and 3' end of "g".

<400> 51

15 gatccgaacg tgttgaatgg ctgcgtaaaa aactgcagga cgttcataac g 51

<210> 52

<211> 51

20 <212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Complementary DNA of Sequence 51

25

<400> 52

06879257.061201

gatccgttat gaacgtcctg cagtttttta cgcagccatt caacacgttc g 51

<210> 53

5 <211> 28

<212> DNA

<213> Artificial Sequence

<220>

10 <223> Description of Artificial Sequence: Oligonucleotide primer

<400> 53

tatgaccatg attacggatt cactggcc 28

15

<210> 54

<211> 26

<212> DNA

<213> Artificial Sequence

20

<220>

<223> Description of Artificial Sequence: Oligonucleotide primer

<400> 54

25 ctgcccggtt attattatatt ttgacaccag 26

00079257 061201

<210> 55

<211> 31

<212> DNA

<213> Artificial Sequence

5

<220>

<223> Description of Artificial Sequence: Oligonucleotide primer

<400> 55

10 taggatccta cgccaatgtc gttatccagc g

31

<210> 56

<211> 30

15 <212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Oligonucleotide primer

20

<400> 56

ttggatccag tgaagegacc cgcattgacc

30

09070257.061201